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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

DOUGLAS P. BROWN, JEETENDRA CHAWARE, and
MANJULA KOPPURAVURI

Appeal 2008-0681
Application 09/977,038¹
Technology Center 2100

Decided: August 7, 2008

Before HOWARD B. BLANKENSHIP, JEAN R. HOMERE, and
JAY P. LUCAS, *Administrative Patent Judges*.

HOMERE, *Administrative Patent Judge*.

DECISION ON APPEAL
STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from the Examiner's
rejection of claims 1 through 21, 40, and 43 through 46. Claims 22 through

¹ Filed on Oct. 12, 2001. The real party in interest NCR Corp.

39, 41, and 42 have been canceled. We have jurisdiction under 35 U.S.C. § 6(b). We affirm-in part. We enter a new ground of rejection.

The Invention

Appellants invented a method and system for selecting indexes in a database. (Spec. 2.) As depicted in Figure 1, the system includes a plurality of target database systems (14A, 14B), each having a database management software (36) that manages access of data in a respective relational tables. (Id. 5.) The system also includes a client (20) that contains an emulation tool (22) for exporting target level emulation data (TLE) (i.e., environment information such as cost-related information, statistics, random samples, DML and DDL statements) from the target database system (14) to a test system (10), which tests the database software before it is released for loading on the target database systems (14A, 14B). (Spec. 4-6.) The target database systems (14A, 14B), the client system (20) and the test system (10), each includes an index wizard for providing a set of candidate indexes for a plurality of queries generated from the environment data. (Id. 4.) Each of the target database systems (14A, 14B), and the test system (10), further includes an optimizer module that identifies and selects for a given query the most efficient query plan that has the lowest cost or the lowest response time depending on the optimization approach being adopted. (Id. 7.) An understanding of the invention can be derived from exemplary independent claims 1 and 7, which read as follows:

1. A test system comprising:

at least one processor;

an emulation module executable on the at least one processor to receive environment information of a database system separate from the test system, the emulation module to emulate an environment of the database system based on the environment information;

a first module executable in the emulated environment and adapted to receive a set of queries and to provide a set of candidate indexes for the set of queries, the first module adapted to eliminate one or more candidate indexes based on one or more predetermined criteria; and

a second module executable in the emulated environment and adapted to generate a recommended index from the set of candidate indexes.

7. A system comprising:

at least one processor;

a first module executable on the at least one processor to receive a set of queries and to provide a set of candidate indexes for the set of queries, the first module adapted to eliminate one or more candidate indexes based on one or more predetermined criteria; and

an optimizer adapted to generate a recommended index from the set of candidate indexes,

wherein the one or more predetermined criteria comprises a threshold change rate, the first module adapted to eliminate one or more candidate indexes having a change rate exceeding the threshold change rate.

In rejecting the claims on appeal, the Examiner relied upon the following prior art:

Agrawal

US 6,366,903 B1

Apr. 02, 2002
(filed Apr. 20, 2000)

The Examiner rejected the claims on appeal as follows:
 Claims 1 through 21, 40, 43 through 46 stand rejected under 35 U.S.C.
 § 102(e) as being anticipated by Agrawal.

FINDINGS OF FACT

The following findings of fact (FF) are supported by a preponderance of the evidence.

Agrawal

1. Agrawal discloses a system for quickly selecting and recommending beneficial indexes and material views for a specified workload of a given database. (Col. 3, ll. 45-52.)
2. As depicted in Figure 2, upon receiving from a database administrator a database workload (215) (i.e., a set of queries and updates which are run against a given DB, col. 2, ll. 38-39), a syntactic structure selection module (220) generates syntactically relevant indexes, and materialized views that can be used to answer a query associated with the workload. (Col. 6, l. 56- col. 7, l. 21.)
- 3a. Agrawal further discloses a candidate materialized view selection module (225) and a candidate index selection module (230) for the workload (215) that identifies spurious indexes and materialized views to subsequently prune uninteresting queries, thereby focusing the search on a smaller subset of interesting queries. (Col. 7, ll. 22-30.)

3b. Agrawal also discloses that a user can enter commands into a computer (20) using a keyboard (40), a mouse (42) and a monitor (47) to eliminate spurious candidate indexes and views, as well as to determine the optimal query for the workload.

4a. Additionally, Agrawal discloses an optimizer (240), which is part of a database server (245), uses the subset of interesting indexes and views along with associated cost information to generate an optimized query plan for the workload. (Col. 7, ll. 48-63.)

4b. Agrawal also discloses using a greedy algorithm along with cost information in an optimizer to generate a recommended index for the workload. (Col. 7, l. 67-col. 8, l. 22.)

PRINCIPLES OF LAW ANTICIPATION

It is axiomatic that anticipation of a claim under § 102 can be found only if the prior art reference discloses every element of the claim. *See In re King*, 801 F.2d 1324, 1326 (Fed. Cir. 1986) and *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1458 (Fed. Cir. 1984).

In rejecting claims under 35 U.S.C. § 102, a single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation. *Perricone v. Medicis Pharmaceutical Corp.*, 432 F.3d 1368, 1375-76 (Fed. Cir. 2005), citing *Minn. Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 1565 (Fed.

Cir. 1992). Anticipation of a patent claim requires a finding that the claim at issue “reads on” a prior art reference. *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1346 (Fed Cir. 1999) (“In other words, if granting patent protection on the disputed claim would allow the patentee to exclude the public from practicing the prior art, then that claim is anticipated, regardless of whether it also covers subject matter not in the prior art.”) (internal citations omitted).

ANALYSIS

Claims 1-4 and 17-21

Independent claim 1 recites in relevant part an emulation module that receives environment information of a database system separate from a test system to thereby emulate an environment of the database system. (Claims Appendix.) Appellants argue that Agrawal does not teach these limitations. Particularly, Appellants submit that Agrawal discloses an optimizer that is part of the database system, as opposed to being separate of the database to emulate the database environment. (App. Br. 5-6, Reply Br. 2-3.) The Examiner, in response, finds that Agrawal’s disclosure of an optimizer receiving a workload data to generate an optimum query execution plan for the workload teaches an emulation module that uses environment data from a separate database to emulate the database environment. (Ans. 11-12.)

Therefore, the first issue before us is whether one of ordinary skill in the art would find that Agrawal’s disclosure, as a whole, teaches an emulation module that emulates a database environment using environment

data of the database, which is separate from a test system, as claimed. We answer this inquiry in the affirmative.

We begin by considering the scope and meaning of “an emulation module . . . to receive environment information of a database system separate from the test system,” which must be given its broadest reasonable interpretation consistent with Appellants’ disclosure, as explained in *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997):

[T]he PTO applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification.

Id. at 1054. *See also In re Zletz*, 893 F.2d 319, 321 (Fed. Cir. 1989) (stating that “claims must be interpreted as broadly as their terms reasonably allow.” Appellants’ Specification states the following:

The system emulation tool 22 in the client system 20 is able to export target-level emulation (TLE) data from the target database system 14A, 14B over the data network 12. Once the TLE data [sic] is stored in data files in the client system 20, the system emulation tool 22 sends the TLE data to the test system 10. This is referred to as importing the TLE data to the test system 10... The TLE data exported by the system emulation tool 22 includes environment information, such as cost-related information, statistics, random samples, DDL statements, DML statements, actual database data, and so forth, from the database target systems 14. The environment information is then imported to the test system 10, with the environment information maintained as target-level emulation data 40. With the ability to export TLE data from a target database system 14 and to import the TLE data into the test system, an accurate test

environment (to emulate a target database system14) can be created in the test system 10 in which various tests can be performed.
(Emphasis added.)

(Spec. 6, ll. 14-26.)

Our reviewing court further states, “the ‘ordinary meaning’ of a claim term is its meaning to the ordinary artisan after reading the entire patent.”

Phillips v. AWH Corp., 415 F.3d 1303, 1321 (Fed. Cir. 2005.)

Upon reviewing Appellants’ Specification, we find that the emulation tool is located in the client, and not in the test system.² We further find that the emulation tool receives environment data from an external database, and exports the emulated data to the test system to create a test environment that emulates the database in the test system. We find, however, no definition or discussion of the term “module” in the Specification. Additionally, we note that Appellants’ Summary of the Claimed Subject Matter incorrectly refers to figure 1, item 18 as the emulation module (App. Br. 2.) Appellants’ Specification, nonetheless, depicts item 18 as an optimizer, and the emulation tool as item 22 in figure 1. Since the claim recites the emulation module as being part of the test system,³ we broadly construe the cited limitation at issue to mean, consistent with the Specification, that the test system imports emulation data from an external database to create a test environment that emulates the database.

² See new ground of rejection *infra*.

³ *Id.*

As detailed in the Findings of Facts section above, Agrawal discloses a system (210) that receives a workload (215) from a database administrator. (FF. 2.) The system further includes a syntactic structure selection (220) that breaks the workload down into representative candidate views and indexes. (Id.) Further, Agrawal discloses that the system uses cost information along with selected indexes and views to generate an optimal query plan for the workload. (FF. 4a.) One of ordinary skill in the art would readily recognize that the generated candidate indexes and views are environment information that emulates the database system from which the database administrator obtained the workload. In other words, the ordinarily skilled artisan would recognize that the set of queries and updates obtained from the DB administrator are actual database data imported by Agrawal's system for the purpose of combining them with cost information to generate an effective query plan. Similarly, the ordinarily skilled artisan would appreciate that the generated candidate indexes and views are merely another representation of the workload information broken into subsets of query indexes and views for faster processing. Therefore, Agrawal's candidate views and indexes teach emulating the workload information. Further, the ordinarily skilled artisan would recognize that the cited database is separate from the cited system since the database administrator, and the administered database in question are external to the disclosed system. Therefore, the ordinarily skilled artisan would appreciate that Agrawal's system teaches a test system that imports data from an external database to create candidate indexes and views that emulate the database. It follows that

Appellants have not shown that the Examiner erred in finding that Agrawal anticipates independent claim 1.

Appellants did not provide separate arguments with respect to the rejection of claims 1 through 4, and 17 through 21. Therefore, we select independent claim 1 as being representative of the cited claims. Consequently, claims 2 through 4, and 17 through 21 fall together with representative claim 1. 37 C.F.R. § 41.37(c)(1)(vii).

Claim 5

Appellants argue that Agrawal does not teach scanning samples of one or more tables, the samples being less than all the rows of the one or more tables. (App. Br. 6-7, Reply Br. 4.) We do not agree. Agrawal teaches eliminating spurious indexes and views from the generated candidate indexes and views in order to search interesting and relevant tables. (FF. 3a.) One of ordinary skill would readily appreciate that the search of such reduced subsets teaches searching candidate samples having fewer than all the rows in the original workload. It follows that Appellants have not shown that the Examiner erred in finding that Agrawal anticipates dependent claim 5.

Claim 6

Appellants argue that Agrawal does not teach a graphical user interface for receiving an indication of a user-specified size of a sample. (App. Br. 7, Reply Br. 4.) We do not agree. Agrawal teaches that a user can enter commands and information into a personal computer using a keyboard,

mouse in cooperation with a monitor to eliminate spurious indexes and views from the generated candidate indexes and views in order to search interesting and relevant tables. (FF. 3b.) One of ordinary skill would readily appreciate that Agrawal's disclosure of using the keyboard in conjunction with a monitor to enter commands into the computer to eliminate spurious candidate indexes and views teaches a user interface to permit the user to enter a specified size sample. It follows that Appellants have not shown that the Examiner erred in finding that Agrawal anticipates dependent claim 6.

Claims 9-16

Appellants argue that Agrawal does not teach an analysis module adapted to apply genetic algorithm in cooperation with an optimizer to generate a recommended index. (App. Br. 7, Reply Br. 5.) We agree. Agrawal teaches using a greedy algorithm in conjunction with an optimizer to generate a recommended index. (FF. 4b.) One of ordinary skill would readily appreciate that Agrawal's disclosure of a greedy algorithm does not entail the use of reproduction, mutation, and crossover operators that are fundamental to the genetic algorithm. (Spec. 29.) It follows that Appellants have shown that the Examiner erred in finding that Agrawal anticipates dependent claims 9 through 16.

Claim 46

Appellants argue that Agrawal does not teach environment information includes cost information, statistics, and random samples from the database. (App. Br. 8.) We do not agree. Agrawal teaches that the database environment includes queries and updates run against the database. (FF. 2.) Even though the content of Agrawal's the environment data is different from that of the claimed invention, Appellants cannot rely solely upon such the content of such information to patentably distinguish the claims over the prior art of record. The content of such information is non-functional descriptive material, and it is therefore not entitled to any patentable weight. It follows that Appellants have not shown that the Examiner erred in finding that Agrawal anticipates dependent claim 46.

Claims 7, 8, 40, and 43-45

Appellants argue that Agrawal does not teach eliminating candidate indexes that are changed with updates at a rate of change exceeding a threshold rate. (App. Br. 9-11.) We agree. Such teaching is simply missing from Agrawal's disclosure. It follows that Appellants have not shown that the Examiner erred in finding that Agrawal anticipates claims 7, 8, 40, and 43 through 45.

Claims 1 through 6 and 9 through 21

New Ground of Rejection

Using our authority under 37 C.F.R. § 41.50(b), we reject claims 1 through 6 and 9 through 21 under 35 U.S.C. § 112, first paragraph.

Independent claim 1 recites in relevant part “[a] test system comprising... an emulation module...” We note that claim 1 was amended in paper filed on 05/17/04 to recite that the test system includes the emulation module. After reviewing Appellants’ Specification, we found no support in the Specification for this amendment. Thus, claim 1 fails to comply with the written description requirement.

Claims 2 through 6 and 9 through 21 are rejected for fully incorporating the deficiencies of independent claim 1, by virtue of their dependency thereon.

II. 37 C.F.R. § 41.50(b)

37 C.F.R. § 41.50(b) provides that, “[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review.”

37 C.F.R. § 41.50(b) also provides that the Appellants, *WITHIN TWO MONTHS FROM THE DATE OF THE DECISION*, must exercise one of the following two options with respect to the new grounds of rejection to avoid termination of proceedings (37 C.F.R. § 1.197 (b)) as to the rejected claims:

- (1) *Reopen prosecution*. Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner ...

(2) *Request rehearing.* Request that the proceeding be reheard under 37 C.F.R. § 41.52 by the Board upon the same record ...

CONCLUSION OF LAW

Appellants have not shown that the Examiner erred in finding Agrawal anticipates claims 1 through 6 and 17 through 21 under 35 U.S.C. § 102(e). However, Appellants have shown that the Examiner erred in finding that Agrawal anticipates claims 7 through 16, 40, and 43 through 45 under 35 U.S.C. § 102(e). We have entered a new ground of rejection against claims 1 through 6 and 9 through 21 as failing to comply with the written description requirement. Because of the new ground of rejection, our decision is not a final agency action.

DECISION

We affirm the Examiner's decision rejecting claims 1 through 6 and 17 through 21. However, we reverse the Examiner's decision rejecting claims 7 through 16, 40, and 43 through 45. Further, we reject claims 1 through 6 and 9 through 21. Therefore, claims 1 through 6 and 9 through 21 are not patentable.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART

rwk

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